The impact of firm size and liquidity on the cost of external finance in Africa

Article (Accepted Version)

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Abstract

Established illiquidity measures are constructed for emerging markets in Africa and used to determine which best explain trading costs. Costs of equity are derived from an augmented CAPM for a sample of emerging financial markets generally ignored in the literature. These include: South Africa and Namibia, three countries in North Africa and four in SSA, plus London and Paris as examples of integrated markets. Minimum variance portfolios are constructed and asset weights derived, with the sample divided into countries dependent on their legal regime. Portfolio weights are shown to be directly related to well-regulated markets with high standards of corporate governance and disclosure and firms seeking cost effective finance from SSA stock markets are at a distinct disadvantage compared with those in Northern Africa, South Africa, and in particular, London and Paris.

JEL classification: G11, G12, G15, O55

Keywords: Liquidity, Portfolio Diversification, Emerging Financial Markets, Africa

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1. INTRODUCTION

During the last two decades external finance to firms in Africa has been determined by the introduction of in new stock exchanges and financial markets are now the centre of development policy of organisations such as the New Partnership for Africa's Development (NEPAD) and the African Development Bank (ADB) (NEPAD Council, 2012). For example, stock exchanges now exist in Sierra Leone, the Cape Verde Islands, Cameroon, Gabon, Rwanda and Mozambique. However, transactions costs in these markets are extremely high and thus a huge barrier to firm investment and growth and while much of the established literature on external firm finance in developing countries has focussed on the debate between banking and capital markets, only recently has the role of legal and governance systems in determining transactions costs as a factor in the source of funds been emphasised.

Active and well regulated stock markets can be a useful mechanism for countries to attract foreign portfolio and direct investment and thus, it is important to consider the cost effective provision of development finance in emerging stock markets in Africa. One approach is to incorporate the influence of legal political and governance systems as this has been shown to have a large impact on access to funds and on the costs of financing (Hearn and Piesse, 2013). For example, the barriers to growth of formal stock markets in Africa has been reviewed using data from the very small markets in Swaziland and Mozambique (see Hearn and Piesse, 2009a) and Cote d'Ivoire's regional exchange (Lavelle, 2001).

The market microstructure literature states that asset prices emerge from the dual functions of stock markets, liquidity and price discovery, and if there is symmetric information market participants learn from equilibrium prices (O'Hara, 2003). In this context prices represent information and do not simply enable brokerage to take place. Innovations to this basic model are the difference between informed and uninformed traders, while maintaining symmetric information (Grossman-Stiglitz, 1980). Black (1986) describes uninformed market participants as noise traders, who commonly act on overconfidence, make errors in updating information and hence bear losses that mirror the gains of informed traders and are therefore central to market efficiency.

However, a major shortcoming of these theoretical models in the context of emerging and frontier markets in Africa is their size and limited number of participants and these factors combine to ensure that markets are incomplete. Trading is concentrated in a handful of stocks and involve small groups of traders and thus these domestic markets are segmented (Hearn, 2012; Hearn and Piesse, 2012). These problems are exacerbated by the lack of regulation and effective monitoring,

poor standards of corporate governance and no common accounting systems, all of which widen the gap between informed and uninformed traders.[1]

Liquidity is essential to provide price discovery in stock markets and transaction costs that result are reflected in a premium in pricing models (Amihud and Mendelson, 1986; 1988), (Chordia et al, 2000); (Pastor and Stambaugh, 2001) and (Amihud, 2002)). Importantly, liquidity is the informational risk to uninformed traders that that cannot be diversified. An effective measure is the bid-ask spread, but again in the African context this is not satisfactory as markets quotes are infrequent (Lesmond, 2005). During the past decade several empirically based measures have been developed that reflect various aspects of indirect trading costs, such as depth and resiliency, although there is little consensus regarding the relative value of these proxies in capturing liquidity. Thus, the first contribution in this paper is to determine which measure best explains total trading costs in frontier markets: the price-impact measure (Amihud, 2002), simple turnover or the trading speed measure (Liu, 2006).

Further evidence of the importance of liquidity in asset pricing was reported by Fama and French (1993) who included liquidity and firm size in a three-factor framework and more recently Pastor and Stambaugh (2003) who noted that investors require higher expected returns for holding assets that are difficult to sell when aggregate liquidity is low. Other examples of this literature are a single country study by Martinez (2005) on the Spanish stock market and cross country studies (see Hearn, 2009, 2011, 2012 and Hearn and Piesse, 2010a,b for Africa). However, these studies ignore the markets in Africa that are most likely to be considered as investment opportunities for overseas fund managers. Thus, the second contribution of the paper is to include size and liquidity effects within a three factor pricing model, but applied to three separate groups of African markets: the North, Sub-Saharan and South Africa and Namibia.

The sample is motivated by a wish to consider countries with a heterogeneous mix of formal and informal institutions and also to link these with OECD markets. Informal institutions in North Africa are based on classical Islamic shari'ya law (Kuran, 2004) with French civil code legal, judicial and government institutions that reflect their colonial legacy (Hearn, 2011; Hearn et al, 2012). Sub-Saharan Africa (SSA) is largely characterised by informal institutions based on indigenous Ubuntu philosophy that promotes common values and conflict resolution through consultation (Hearn, (2012); Roussouw, (2005)) while formal institutions reflect aspects of European legal and governance systems. South Africa and Namibia are fundamentally different and follow the colonial model and influenced by English common law (Levine, 2005). For this reason the markets in London and Paris are also included in the sample.

The results show that liquidity and size are significant in explaining cross section returns and outperform the traditional CAPM. Furthermore, the SSA markets of Zambia, Kenya and

[1] For evidence of weak form informational efficiency of stock prices in Africa see Alagidede and Panagiotidis (2009).

Nigeria have the highest costs of equity, greater than 30%, while the three North African markets are slightly lower, at between 20-30%. South Africa and Namibia are typically less than 20% but still well above the 1% of stocks in the French and UK markets. This variation in cost of equity faced by investors is further reflected in optimized asset holdings from minimum variance portfolios where those assets with highest costs of equity would be expected to be least attractive to rational investors. Thus, in the four markets with civil code legal regimes, asset weights are concentrated on the French CAC40 plus Morocco and Egypt with less emphasis on Tunisia. Similarly, in the common law markets, asset weights are concentrated on the London FTSE100 and Namibia and South Africa with only a fraction dispersed amongst Sub-Saharan African markets.

This paper is structured as follows. Section 2 introduces the liquidity measures, their construction and data used in them. Section 3 discusses data used in further estimation, including sources and problems associated with heterogeneous markets such as those in this study. Section 4 outlines the models used and section 5 discusses the results. The final section concludes.

2. MEASUREMENT OF LIQUIDITY-BASED TRANSACTIONS COSTS

The Bid Ask spread and commission cost

The Bid Ask spread and commission cost: Data on the end of month bid and ask quotes were from Datastream for UK (FTSE All-Share and FTSE100), France (CAC All-Share and CAC40) and South Africa, and from Bloomberg for Tunisia. Data triangulation from multiple sources for Egypt and Morocco ensured integrity as Datastream, Bloomberg and the national stock exchanges were used. The national stock exchange provided data for Namibia. The average bid-ask spread for the quarter is used to estimate the spread to minimize outliers and other sampling errors and those that exceed 80% are removed, following Lesmond (2005). The monthly quoted spread is defined as:

$$Quoted\ \ spread_M = 0.5 * \left[\left(\frac{(Ask_M - Bid_M)}{(Ask_M + Bid_M) * 0.5} \right) + \left(\frac{(Ask_{M-1} - Bid_{M-1})}{(Ask_{M-1} + Bid_{M-1}) * 0.5} \right) \right] \quad (1)$$

where M indicates that the respective monthly average of daily bid and ask prices. To estimate the total trading transaction costs, those associated with a buy and sell are added to the quoted spread for each month. Brokerage and Exchange fees are calculated from the fee schedules in described in Appendix 1.

Turnover

Daily traded volume and total number of shares issued and outstanding data were from Datastream for UK, France and South Africa with triangulation to ensure integrity and accuracy for Egypt, Morocco and Tunisia. There is considerable variation in this measure on an intra-market basis reflecting differences in both liquidity and turnover for many firms listed. Turnover that exceeded 100% of shares outstanding in any month were removed. The daily turnover measure is defined as:

$$D_M^{-1}\sum_{t=1}^{M}(volume_t/\text{shares - outstanding}) \quad (2)$$

where D_M^{-1} is the inverse of the number of trading days in the month, M.

Amihud (2002) measure

Daily price and traded volume data were from the same sources and constructed as the turnover outlined above. The daily security prices were checked for data errors, omissions and delistings and these were used to calculate daily returns. To control for outliers, a data error filter removed daily prices that were +/- 50% of the prior day's price and that day's price as well as the previous day's price were deleted. Equally if zero volume occurs on day t, then that day was deleted from the average. Finally the measure is multiplied by 10^6 following Amihud (2002) to provide a common range and ease comparisons. The Amihud measure is defined as:

$$D_M^{-1}\sum_{t=1}^{M}(|R_t|/\text{Price}_t \times Volume_t) \quad (3)$$

where $|R_t|$ is the positive modulus of daily stock returns formed from daily closing prices.

Liu (2006) measure

This multidimensional Liu measure is from Liu (2006) and defined as LM_x which is the standardized turnover-adjusted number of zero daily trading volumes over the prior x months (x = 1, 6, 12) i.e.

$$LM_x = \left[(\text{Number of zero daily volumes in prior x months}) + \frac{\text{1/x month turnover}}{\text{Deflator}}\right] * \frac{21x}{M} \quad (4)$$

where *x* month turnover is the turnover over the prior *x* months, calculated as the sum of the daily turnover over the prior *x* months, daily turnover is the ratio of the number of shares traded on a day to the number of shares outstanding at the end of the day, M is the total number of trading days in the market over the prior x months, and Deflator is chosen such that,

$$0 < \frac{1/x\text{–}month\text{–}turnover}{Deflator} < 1 \quad (5)$$

for all stocks[2]. Given the turnover adjustment (the second term in brackets in first expression), two stocks with the same integer number of zero daily trading volumes can be distinguished: the one with the larger turnover is more liquid. This acts as a tie-breaker when sorting stocks based on the number of zero daily trading volumes over the prior x months. Because the number of trading days can vary from 15 to 23, multiplication by the factor (21x/ NoTD) standardizes the number of trading days in a month to 21, which makes the liquidity measure comparable over time. LM1 can

[2] Following Liu (2006) a deflator of 1,000 is used in constructing estimates for LM1

be interpreted as the turnover-adjusted number of zero daily trading volumes over the prior 21 trading days, which is the approximate average number of trading days in a month.

3. DATA

Country Data Sources

In addition to liquidity estimators, daily stock price, traded volumes, total number of shares issued and outstanding (listed) and dividend per share were obtained in local currency and converted to UK£ for all markets. Data were from Datastream for the UK, France, South Africa, Kenya, Egypt and Morocco and Bloomberg for Zambia, Botswana, Nigeria and Tunisia and the national stock exchange for Namibia. Volatility is the daily return variance and market capitalization the product of the number of shares outstanding and the daily closing price. Indices used are the UK FTSE All-Share and FTSE100 indices, the French CAC All-Share and CAC40 and national stock indices for South Africa, Egypt and Morocco. Indices for Nigeria, Tunisia, Zambia, Botswana and Namibia were constructed using Standard & Poors methods. Exchange rates and UK-Gilt/Treasury yields were from Datastream. The one-month UK-Gilt/Treasury Bill yield rate represents the risk free rate adjusted to take account of monthly excess returns rather than quoted equivalent annualised rates. Conversion of the total returns series and prices into UK£ and the use of UK - Gilt/Treasury yield rate assumes long term parity between individual domestic currencies and sterling. Some firms were deleted from the sample due to data inconsistencies or unavailability, for example, there were 234 listings on the Nigerian Stock Exchange but the sample size is 129 for Nigeria, due to missing or inconsistent data.

Summary statistics relating to liquidity measures

The unequal distribution of both market capitalization and traded value for the major African markets is clear from Table 1. In the Table, market capitalization is very often highly concentrated in a single industry such as the financial sector, which accounts for 59.74% in Nigeria, 57.38% in Tunisia, 42.04 in Morocco, 85.33% in Botswana and 70.45% in Namibia. Furthermore, despite numerous listings, market capitalization and traded value are often concentrated in a single stock or within the top five stocks, reflecting recent literature (see Hearn and Piesse, 2010 for West Africa; Hearn, 2010 for North Africa; and Hearn, 2012 for SSA).

Several examples of intra-market segmentation that result from this concentration are in Table 2. The difference in bid-ask spread between the aggregate market and the top tier blue chip stocks is evident in Tunisia with the aggregate market 53.37% and for the top five stocks it is 6.40%. In South Africa the difference is 25 times, with values 10.07% and 0.40%, respectively. However, while similar differences in price rigidity (the proportion of zero returns in a month) and mean trading volumes and capitalizations between top tier stocks and the overall market are also

apparent, the highest levels of price-rigidity and thus lowest stock prices are in the SSA markets.[3] Low prices in these markets reflect increased risks faced by traders (Stoll, 2000) and are a function of lack of institutional development and regulatory structure in the region.

Tables 1 and 2

4. ESTIMATION

(i) Selection of appropriate liquidity measure

The first set of models use OLS estimation to determine which of the liquidity measures discussed above best explain total trading costs, defined as the bid-ask spread plus brokerage and exchange fees. Four firm-specific liquidity measures from Stoll (2000) are used as controls; price, traded volume, daily return volatility and firm size, or market capitalization. As such Stoll (2000) outlines market controls of stock price, return volatility or variance, traded volume and market capitalization. Price controls for discreteness and acts as an additional proxy for risk as low stocks tend to be riskier while increases in volume, number of trades and firm size (market capitalization) all increase the probability of locating a counterparty and thus are associated with reducing inventory risk. Additionally the stocks return variance measures the risk of adverse price changes on stocks placed in inventory which is especially important consideration given evidence from Stoll (1978) and Ho and Stoll (1981) that suppliers of immediacy are not well diversified in respect of stocks placed in inventory. It is notable that while the theoretical model of market model and supply of immediacy (liquidity) that governs the controls introduced by Stoll (2000) is based on large, liquid and sophisticated US equity market and trading centres, these controls have largely become standard (see Lesmond (2005) for discussion on this issue). In these regressions the three measures are included separately and then together for each of the markets individually.

(ii) Size and Liquidity Augmented CAPM

Following the three-factor CAPM (Fama and French, 1993) this paper extends Martinez et al (2005) and Shum and Tang (2005) and takes account of size and liquidity effects that improve the performance of the model in the context of emerging and developing markets.

The construction of the market, size and liquidity factors used in the CAPM follow the existing literature and in this paper the portfolios of stocks are constructed annually from 2002 to 2008. Portfolios are formed from the available stocks sorted into equally weighted portfolios. The market portfolio is the arithmetic mean of the cross section of total returns in the sample. These are sorted each year first by market capitalization and divided into three size ranked portfolios, "Small", "Medium", and "Big", and then each of these further sorted into another three portfolios based on liquidity. The size factor is formed from the cross sectional mean returns of the small size minus

[3] Botswana is the exception where the highly profitable mining sector dominates.

the big size portfolio and is referred to as the SMB factor, following the notation of Fama and French (1993). The liquidity estimator with the greatest statistical strength in explaining total trading costs is used to rank stocks into portfolios based on their relative liquidity and is based on the mean of each of the three "High" illiquidity sorted portfolios minus the mean of the "Low" illiquidity portfolios. This is referred to as the HML factor, following the notation of Liu (2006).

The market universe is complicated by the lack of appropriate regional benchmarks in Africa, and in particular in SSA, and by the inappropriate assumption of integrated asset markets.[4] Therefore, the aggregate market for the UK and France are proxied using their respective indices, Egypt, Tunisia and Morocco for North Africa and South Africa and Namibia for South Africa. The aggregate market for SSA includes Nigeria, Kenya, Zambia, Botswana and Namibia. The use of regional groups addresses the problem of extremely heterogeneity between markets and allows this extension of the asset pricing literature to small emerging and developing markets to be (see Hearn (2012) for South African and smaller East African markets and Hearn and Piesse (2010) for a mix of North and West African markets plus France and the UK).

The three-factor CAPM can now be restated as the expected return on a risky portfolio *p*, in excess of the risk free rate $E(R_p) - R_f$, is a function of (i) excess return on the market portfolio, $R_m - R_f$; (ii) the difference between the return on a portfolio of small-size stocks and of large-size stocks, SMB; and (iii) the difference between the return on a portfolio of high illiquidity stocks and of low illiquidity stocks, ILLIQ. Therefore, the expected excess returns on a portfolio *p* of emerging market stocks can be written as

$$E(r_{pt}) - r_{ft} = \beta_p \left[E(r_{mt}) - r_{ft}\right] + s_i E(SMB) + h_i (ILLIQ) \qquad (6)$$

This relation is stated in terms of expected returns but to test the model it is necessary to transform (8) to the following estimating equation:

$$r_{it} - r_{ft} = \alpha_i + \beta_i (r_{mt} - r_{ft}) + s_i SMB_t + h_i ILLIQ_t + \varepsilon_{it} \qquad (7)$$

where the variables are described above and $\varepsilon_{p,t}$ is an iid disturbance term. The model is estimated using Ordinary Least Squares following Pastor and Stambaugh (2003), Liu (2006) and Martinez (2005), all of whom use this approach in multi-factor CAPMs to capture liquidity effects where there are no appropriate regional benchmark market indices as is the case here. The constant term is expected to be not statistically different from zero.

(iii) Implications for investors risk diversification

Finally, the implications for investors risk diversification are explored using annual optimized portfolios (see Harvey (1994) and Jackson and Staunton (2005) for outline of methods). Two portfolios using stocks representing from civil code and common law markets are constructed.

[4] The segmentation noted in these markets is discussed above.

These are equally weighted portfolios comprised of the top stocks in each market. Conditional means are generated from these top stocks from the augmented CAPM outlined above.

5. RESULTS

(i) The impact of liquidity on total trading costs

Results of regressions to estimate the association of the three liquidity constructs with total trading costs are in Table 3. With the exception of the London FTSE100 and Namibian indices, all models show a large, positive and highly statistically significant result for the Liu (2006) multi-dimensional measure. These models also have the highest explanatory power by individual market and in aggregate. Only in the London FTSE100 model does the Amihud (2002) price-impact measure perform better in explaining total trading costs, most likely because this is a large, well-regulated, and long established market. For Namibia, the turnover ratio is found to have statistical superiority, which is probably a function of the very small and extremely illiquid nature of this market.

The relationships between the market control variables and total trading costs reflect those of Stoll (2000) and are appropriate in the context of emerging markets as discussed by Lesmond (2005). There is generally a negative and statistically significant relationship between stock price and total trading costs suggesting inventory risks for traders seeking to hold stocks in portfolios, while that between volatility and illiquidity is positive, with greater illiquidity leading to more erratic price movements. Equally, a negative and statistically significant relationship between traded volume and total trading costs is expected, as illiquidity reflects lower order flow. However, the positive relationships between firm size and total trading costs in the Paris CAC40 index and in Egypt, South Africa and Namibia is the opposite of Stoll (2000), although confirms those of Lesmond (2005) in a study of larger emerging markets.

Table 3

(iii) Summary statistics relating to size-liquidity sorted portfolios

The summary statistics for stocks in the nine size-illiquidity sorted portfolios from each of the five market universes are in Table 4. These are approximately equal for the nine portfolios for the two European markets and for South Africa, which has more concentration in small size-high illiquidity portfolios. Namibian stocks are concentrated in the small size-high illiquidity and medium size-high illiquidity portfolios while the big size-low illiquidity portfolios are dominated by Nigerian stocks. Zambian stocks are the only others to feature in the large size portfolios, though only in the large size-medium illiquidity and large size-high illiquidity portfolios. For Kenya and Botswana stocks tend to be concentrated in the small and medium size portfolios with the latter in medium and high illiquidity sub-portfolios. In North Africa, Egyptian stocks are relatively evenly dispersed across all nine size-illiquidity portfolios, though with more in less illiquid sub-portfolios, indicating greater trading activity of Egyptian stocks compared to others in the region. Moroccan and

Tunisian stocks are concentrated in the large size portfolios and slightly higher concentration in higher illiquidity sub-portfolios reflecting their relative inactivity.

Table 4

The descriptive statistics for all nine size-illiquidity sorted portfolios are in panel A of Table 5. Three general observations are noted. Firstly, returns and standard deviations increase with the UK FTSE All Share and France CAC All Share the lowest, then North Africa, then South Africa and finally the highest in SSA. Secondly, levels of skewness and kurtosis are generally within limits expected of returns distributions such that, with the exception of SSA, all size-illiquidity sorted portfolios approximate to Standard Normal. Deviations from Normality are particularly high in SSA with the greatest for large size–high illiquidity (skewness: 8.07; kurtosis: 70.48), large size–medium illiquidity (skewness: 1.78; kurtosis: 13.26), medium size–medium illiquidity (skewness: 5.17; kurtosis: 37.70) and small size – medium illiquidity (skewness: 4.26; kurtosis: 28.46) portfolios. Thirdly, returns and standard deviation are lowest for the large size–low illiquidity and large size–medium illiquidity portfolios. This suggests larger, more liquid stocks have different properties in their risk-return profiles than the overall market. Separate evidence not reported here[5] show low correlation between market, size (SMB) and liquidity (HML) valuation factors, which provides support for the formation of the samples based on regional factors.

Descriptive statistics for portfolios formed from aggregate national stock markets and top tier stocks are in panel B of Table 5. The national market portfolios indicate that mean returns and standard deviations are highest for the SSA, with Nigeria (return: 4.51%; standard deviation: 15.01%), Zambia (return: 4.29%; standard deviation: 14.86%), and Botswana (return: 3.01%; standard deviation: 17.68%). Similarly, these three national market portfolios have the highest levels of skewness and kurtosis, over ten times that for other national market portfolios. In contrast the portfolios formed from top tier stocks in each of the individual national markets have much lower levels of skewness and kurtosis. However, while mean returns are comparable between overall aggregate market portfolios and their top stock counterparts there is a notable increase in standard deviation for the top stock portfolios in Kenya (9.33%), Egypt (7.86%), Morocco (5.47%) and greatest of all, South Africa (32.84%). These are most likely a result of more activity in top tier blue chip stocks and subsequently greater price movements compared with the rest of the market, a clear indication of intra-market segmentation.

Table 5

(iii) The three-factor CAPM

[5] Correlations between market size (SMB) and liquidity (HML) valuation factors are available from the authors.

Results of the estimation of the traditional CAPM and three-factor models for this sample of emerging markets are in Table 6. The augmentation of the single factor CAPM with the size and liquidity factors increases explanatory power for all size-illiquidity sorted portfolios in all cases, although this is highest in North Africa and SSA, where the increase is greater than 20%. The improved explanatory power is more modest in the UK, France and South Africa. However, the low explanatory power of all asset pricing models in emerging and developing markets is highly questionable, as noted in Hearn and Piesse (2010) and Hearn (2011, 2012).

A further two general observations can be made in regard to the application of the three-factor model in terms of the size and liquidity factors themselves. The first relates to evidence of a "reverse size effect" in Table 6. This was first noted by Martinez et al (2005) and arises from the large, negative and statistically significant coefficients on the size factor common to the three large size portfolios. This phenomenon relates to large firms that further increase in size and hence earn lower returns while small firms that increase in size earn higher returns. This suggests an optimal size for profitable firms, which is not obvious to investors seeking good hedging opportunities. The second is similar and relates to the "reverse illiquidity effect" and suggests that returns increase with increasing illiquidity, despite this being counterintuitive and again provides investors with poor hedging opportunities. This reverse illiquidity effect is clear in the table by the large, positive and statistically significant coefficients on illiquidity in almost all the three high illiquidity portfolios and even many of the medium illiquidity portfolios. This too was found by Martinez et al (2005) in Spain. [6]

Table 6

(iv) Modelling national market portfolios

Modelling of aggregate market portfolios is undertaken from national portfolios formed from all stocks constituent to that market entity as well as stocks constituent to top tier blue chip index within that market. These time series of excess returns of aggregate national market and top tier blue chip stocks portfolios then form dependent variables in a sequence of time series CAPM type regressions. The first being single one-factor CAPM containing only the market universe, this being for example North Africa, Sub Saharan Africa or South Africa. The second augments the simple CAPM initially with only the size factor and then with only the liquidity factor. The third is the full three-factor CAPM augmented by both size and liquidity factors. For brevity these results are not reported in this paper but are available from authors upon request. Some notable general features are however immediately apparent from the results. The first is that the explanatory power of the top stocks portfolios compared to the aggregates is dramatically reduced in all markets, which is a function of their relative attractiveness to investors and hence enhanced liquidity. The

[6] Evidence of both these effects have been reported in North Africa in Hearn (2010) and SSA in Hearn (2012).

explanatory power of all models for the UK FTSE100 portfolio are around 1%-6% and for the French CAC40 portfolio under 1%. Similarly, the explanatory power in all models for Egypt's top stocks portfolio is less than half that of the aggregate market portfolio and the same is true for Morocco, Tunisia, Botswana, Nigeria and South Africa. The second is the presence of a persistent reverse size effect in almost all models, with the exception of the French CAC40 and the aggregate market portfolios of Egypt, Tunisia, Nigeria, Zambia and Namibia. A reverse illiquidity effect is found for Morocco, Tunisia, Botswana, Zambia and Namibian top stocks and aggregate market. These markets are all small and very illiquid compared to the larger markets and again brings into question the appropriateness of asset pricing models in small, emerging markets. A third general observation relates to the statistical significance of the Jensen alpha, α_p, in all models and portfolios. These constant terms are statistically significantly different from zero in CAPM and augmented CAPM models applied to the aggregate national market portfolios of Egypt, Morocco, Nigeria and South Africa and the top stocks portfolio of Botswana, indicating intra-market segmentation.

(v) Implications for capital issuers and investors

Costs of equity

Table 7 reports estimates of the cost of equity from a foreign investor perspective for portfolios representing aggregate national stock markets and the top tier stocks, calculated from the three factor CAPM[7] drawing on the results of preceding section. These indicate that costs of equity for the two top tier European markets are very low, less than 1%, which makes them both attractive to firms that can afford the high regulatory and governance costs involved in listing there.

The three North African markets have the next highest costs of equity, that is the aggregate markets of Morocco (18.63%), Tunisia (9.21%) and Egypt (33.11%). However, further evidence of segmentation in the region is the significantly higher cost of equity of the top tier stock portfolios compared to the aggregate market, despite their attractiveness to investors and increased trading activity. Examples of this are Egypt (33.52%), Tunisia (29.13%) and Morocco (20.88%). The next highest costs of equity are in South Africa, both the aggregate market (31.41%) and the top tier stocks (13.36%), plus Namibia (17.28%). These results support Hearn and Piesse (2009) and provide explain the recent move by top tier blue chip listed firms, Anglo-American and Old Mutual, from a primary listing in Johannesburg to London.

Finally the highest estimates of cost of equity are found in national stock markets in SSA. These values are extremely high, for example, 28.07% (Kenya), 46.69% (Botswana), 56.43% (Zambia) and 63.82% (Nigeria). Similarly for the top tier stocks, Kenya is the lowest (30.99%), followed by Nigeria (32.90%) and finally Zambia (35.53%). Only Botswana is low (6.74%), which

[7] This paper assumes a UK investor for simplicity.

was justified above as a special case. Thus, SSA markets offer investors minimal opportunities for risk-adjusted returns.

Table 7

Portfolio characteristics

Table 8 reports the conditional means and standard errors from portfolio optimization methods based on the traditional and augmented CAPMs estimated above (Harvey, 1994). This information is useful to investors seeking risk diversification opportunities and illustrates differences that result from mean-variance optimized portfolios of top stocks from national markets given the existing legal regime (La Porta et al, 2008). Panel 1 of Table 8 shows that mean returns are lower and standard deviation higher in the common law investment portfolio while the opposite is true in civil code law countries. The major differentiating factor between the two is the value of the Sharpe ratio, 1.5359 for the civil code portfolio and 1.1624 for the common law portfolio, suggesting maximum risk-return and greater potential for risk diversification in the former.[8] However, the top tier stocks in the civil law markets in this sample of emerging and developing stock exchanges exhibit greater price-rigidity and thus increased "lock-in" risk in terms of investment positions.

Finally, the optimized asset weights in the two investment portfolios, based on civil code and common law markets, reflect the cost of equity estimates discussed above. In Panel 2 of Table 8 it is clear that values in the civil code law portfolios are more concentrated over time in Moroccan and Tunisian top stocks with a lesser concentration of French and Egyptian assets. While this is unexpected in the case of the French assets, as these would be expected to feature more prominently in optimized asset holdings given the very low cost of equity of French assets relative to North Africa, the increased concentration in Tunisia and Morocco may partly explain the lower costs of equity between these markets and Egypt. The results from the common law investment portfolio provide even stronger evidence and generally over 50% of optimized asset weights are in the UK FTSE100. Most of the remainder are concentrated between South Africa, Namibia and Botswana with minimal proportions from Kenya, Nigeria and Zambia, all of which have the highest costs of equity.

Table 8

Figures 1 and 2

5. CONCLUSIONS

This paper begins by constructing established illiquidity measures for emerging markets in Africa and uses these to determine which best explain trading costs. The most appropriate measure is then used to model a size and liquidity augmented capital asset pricing model to explain the cross

[8] See the shape of the efficient frontiers in Figures 1 and 2, where the civil code frontier is flatter and more vertical than the common code frontier.

section of expected returns in these markets that have previously been excluded from this literature. Five market universes of stocks are formed because of the lack of integrated markets in the region. These include: London, Paris, South Africa and Namibia, three countries in North Africa and four in SSA. The cost of equity for the aggregate markets and their top tier stocks by market capitalization, are derived from the estimated augmented CAPM.

The results show that firms seeking cost effective finance from SSA stock markets are at a distinct disadvantage compared with those in Northern Africa, South Africa, and in particular, London and Paris. An additional factor is the legal structure under which these markets function and a distinction is made between civil code and common law countries. Optimized asset weights in these portfolios are greatest in the European markets followed by South Africa with minimal dispersion amongst SSA markets. Countries with well-regulated markets and a high standard of corporate governance and disclosure are more attractive and currently these smaller markets must become more competitive relative to larger and more active domestic banking sectors if they are to succeed as sources of external funds. Thus, policy that supports integrated financial markets must take account of the illiquidity and intra-market segmentation that exists in many of these emerging stock exchanges before costs of capital will be attractive to investors.

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Table 1 Market Capitalisation and Turnover profiles, 2008

	Europe		North Africa			Sub Saharan Africa				South Africa & Namibia	
	London	**Paris**	**Egypt**	**Tunisia**	**Morocco**	**Nigeria**	**Kenya**	**Zambia**	**Botswana**	**South Africa**	**Namibia**
Legal Origin	Common	Civil	Civil	Civil	Civil	Common	Common	Common	Common	Common	Common
Listed Firms	100	40	302	53	78	234	46	24	20	373	8
Proportion market capitalisation to total (%)											
Top 1	7.72	9.29	7.43	12.51	27.55	8.40	21.02	18.12	22.29	8.31	55.55
Top 5	30.35	27.51	29.64	43.56	57.81	27.08	63.67	73.22	77.65	30.36	99.12
Top 10	46.12	43.86	43.58	65.23	74.29	44.38	78.79	96.20	92.87	45.44	100.00
Top 20	60.95	61.13	59.69	88.20	88.88	64.33	94.31	100.00	100.00	62.31	-- --
Proportion Turnover value to total (%)											
Top 1	-- --	-- --	11.50	9.69	19.42	9.00	20.44	32.85	18.52	12.74	46.77
Top 5	-- --	-- --	36.81	38.19	58.92	36.45	56.73	92.49	68.53	42.19	100.00
Top 10	-- --	-- --	55.31	61.98	78.00	52.66	74.76	98.71	94.55	59.67	100.00
Top 20	-- --	-- --	78.67	86.51	92.01	69.59	95.78	100.00	100.00	76.28	-- --
Sector Concentration by Market Capitalization (%)											
Financials	17.80	15.14	24.72	57.38	42.04	59.74	46.90	18.25	85.33	28.11	70.45
Comm.	9.74	10.79	18.22	0.31	27.55	1.37	0.96	18.12	-- --	14.09	-- --
Basic Materials	11.98	2.08	14.63	3.89	3.37	0.53	1.63	-- --	-- --	23.86	-- --
Cons cyclical	4.90	5.91	5.00	12.16	2.55	2.81	4.73	1.22	3.04	6.52	-- --
Cons non-cyclical	26.84	17.74	6.59	8.92	4.35	17.79	26.95	37.93	8.84	6.63	21.12
Diversified	0.37	2.89	1.57	12.51	7.39	1.57	0.08	-- --	-- --	4.27	8.42
Energy	19.08	11.68	1.03	0.38	1.46	10.41	4.41	3.43	2.65	9.50	-- --
Industrial	4.21	13.67	18.86	4.45	9.93	5.35	14.33	15.48	0.07	5.58	-- --
Technology	1.13	2.15	0.12	-- --	0.14	0.02	-- --	-- --	0.05	0.31	-- --
Utilities	3.96	17.95	0.18	-- --	1.23	-- --	-- --	5.53	-- --	0.00	-- --

Source: Compiled by authors from Bloomberg and National stock exchanges

Table 2 Summary Statistics

Descriptive statistics for 9 African equity markets plus the constituent stocks of FTSE100 index in UK and CAC40 index in France. Start dates vary for each country while sample end dates are December 2008 across all markets. N is sample size. Price is the mean daily price for each month and converted to UK£ using the mean exchange rate for each month and country. Volume is the mean of the daily trading volume for each month in thousands. Market capitalization is of 1 January for each country and is equity market value for each firm in billions of local currency or UK£. The bid-ask spread is defined in expression 1 (section 2). The monthly mean is for all stocks to obtain a market wide measure. The UK£ market capitalization is the end of month exchange rate for each country and month. Square parentheses indicate median values for each variable.

Country	Sample Period	No. Firms	Daily Zero Return (%)	Local market Price	Volume (m)	Mkt. Cap. (b)	£UK equivalent Price	Mkt. Cap. (b)	Bid-Ask spread (%)
Europe									
London (FTSE 100)	1990M01/ 2008M12	101	12.04 [11.93]	537.89 [539.20]	193.98 [141.91]	9.27 [9.95]	537.89 [539.20]	9.27 [9.95]	0.85 [0.89]
Paris (CAC 40)	1990M01/ 2008M12	40	7.13 [6.26]	37.37 [35.52]	0.63 [0.54]	8.79 [5.34]	25.66 [24.59]	8.82 [8.32]	0.42 [0.39]
North Africa									
Egypt	1999M01/	10	21.08 [21.21]	91.39 [33.45]	13.24 [12.51]	0.83 [0.36]	9.07 [4.74]	0.08 [0.05]	0.77 [0.74]
	2008M12	121	50.92 [53.24]	42.05 [44.83]	6.02 [4.76]	1.54 [0.79]	4.31 [4.86]	0.16 [0.12]	5.62 [6.06]
Morocco	1993M08/	10	43.82 [39.55]	663.27 [636.16]	4.56 [1.50]	12.23 [8.52]	42.63 [40.36]	0.79 [0.53]	0.17 [0.00]
	2008M12	40	66.43 [66.67]	616.07 [635.06]	7.07 [5.20]	4.05 [3.08]	39.62 [39.75]	0.26 [0.20]	0.54 [0.00]
Tunisia	2000M01/	5	50.82 [49.09]	25.40 [21.65]	0.32 [0.22]	0.25 [0.26]	46.26 [41.48]	0.13 [0.12]	6.40 [6.43]
	2007M12	37	64.97 [66.04]	34.65 [32.02]	1.08 [0.83]	0.06 [0.05]	18.93 [16.02]	0.10 [0.09]	53.37 [69.13]
Sub Saharan Africa									
Nigeria	2002M1/	10	41.96 [43.18]	12.04 [7.24]	1,537.13 [920.35]	123.07 [51.59]	0.05 [0.02]	0.54 [0.21]	-- --
	2008M12	129	63.67 [66.94]	18.76 [18.44]	2,631.20 [1,373.23]	30.12 [25.01]	0.08 [0.07]	0.13 [0.10]	-- --
Kenya	1995M01/	5	39.76 [40.00]	39.08 [14.86]	91.43 [28.15]	-- --	0.38 [0.18]	0.15 [0.45]	2.92 [3.24]
	2005M03	37	60.31 [61.63]	45.01 [41.10]	174.10 [59.87]	-- --	0.38 [0.36]	0.03 [0.15]	3.50 [3.62]
Botswana	1996M1/	3	86.13 [87.30]	335.13 [211.32]	5.29 [2.63]	14.13 [11.13]	32.04 [22.37]	151.47 [97.45]	-- --
	2008M12	19	90.49 [91.15]	291.48 [216.36]	11.106 [7.46]	37.29 [23.95]	29.55 [23.29]	3.53 [2.53]	-- --
Zambia	1997M1/	3	79.44 [80.95]	116.50 [39.66]	6.23 [1.15]	415.44 [119.25]	0.02 [0.01]	0.05 [0.02]	-- --
	2008M12	18	89.75 [90.91]	981.18 [636.55]	37.88 [4.12]	157.40 [48.53]	0.16 [0.14]	0.02 [0.01]	-- --
South Africa & Namibia									
Namibia*	1998M02/ 2004M02	7	92.29 [95.23]	9.79 [2.28]	0.62 [0.25]	0.30 [0.21]	2.20 [1.89]	0.02 [0.02]	17.66 [15.65]
South Africa	1996M01/	10	9.35 [8.09]	10.87 [8.84]	436.12 [442.05]	7.15 [50.76]	8.66 [6.82]	5.42 [43.19]	0.40 [0.60]
	2008M11	273	45.44 [45.11]	1.83 [1.37]	1,846.34 [1,635.89]	0.69 [4.99]	1.56 [1.41]	0.53 [4.22]	10.07 [10.38]

Source: Compiled by authors from Bloomberg, Datastream and National stock exchanges

Notes: * Indicates Namibian domestic market of 7 locally listed firms. Remaining 22 Namibian firms have primary listings in South Africa

Table 3 Comparison of liquidity proxies as determinants of total trading costs: Dependent variable is bid-ask spread plus brokerage and exchange fees

Regressions are on a firm-monthly basis. Three liquidity measurement variables are presented. Liu (2006) defined in expressions 4 and 5 (section 2), turnover is a ratio of the traded volume of shares in relation to total number of shares outstanding and is scaled by the number of trading days in the month of measurement. It provides a measure of trading frequency. The final measure is the Amihud (2002) price impact measure, as defined in expression 3 (section 2). Firm size is determined from the first day of each month. Volatility is the average daily stock return variance and price and volume measure the average price (local currency units) and trading volume over an annual trading period. Turnover, price, volume, and market capitalisation are all log scaled in line with Stoll (2000). N is the sample size in firm months. The White cross-section t-statistics are in parentheses.

Market	N	Intercept	Price	Volatility	Volume	Size	Amihud	Liu	Turnover	Adj-R^2
London	17,271	0.097 [29.35]	-0.010 [-27.23]	0.160 [4.78]	-0.007 [-21.94]	-0.001 [-2.44]				54.19%
FTSE100		0.080 [34.09]	-0.008 [-24.18]	0.128 [4.34]	-0.005 [-17.16]	-0.001 [-3.03]	**5.458 [8.54]**			63.92%
		0.097 [29.27]	-0.010 [-26.61]	0.160 [4.85]	-0.007 [-21.21]	-0.001 [-2.52]		0.002 [1.19]		54.22%
		0.083 [35.98]	-0.007 [-20.51]	0.147 [4.58]	-0.002 [-4.91]	-0.005 [-6.97]			**-0.005[-11.31]**	55.90%
		0.067 [36.04]	-0.005 [-15.25]	0.117 [4.15]	-0.001 [-2.62]	-0.004 [-7.65]	**5.378 [8.65]**	**7.54E-05 [0.47]**	**-0.004 [-12.17]**	65.35%
Paris	6,597	0.008 [5.97]	0.001 [1.52]	0.181 [10.80]	-0.011 [-14.93]	0.005 [10.61]				59.99%
CAC40		0.011 [7.88]	0.001 [1.17]	0.104 [3.85]	-0.010 [-12.41]	0.004 [8.49]	**0.001 [3.91]**			64.27%
		0.007 [4.25]	-0.001 [-0.50]	0.142 [9.14]	-0.007 [-17.89]	0.003 [9.88]		**0.002 [10.36]**		72.81%
		0.009 [2.80]	0.001 [1.63]	0.181 [10.62]	-0.010 [-5.00]	0.005 [2.42]			-0.001 [-0.34]	59.99%
		0.001 [0.31]	-0.003 [-0.84]	0.105 [4.71]	-0.010 [-4.51]	0.007 [3.00]	**0.001 [2.13]**	**0.002 [8.47]**	**0.004 [1.74]**	73.89%
Morocco	3,679	-0.004 [-0.96]	0.009 [7.87]	0.238 [3.24]	-0.001 [-0.51]	-0.003 [-4.00]				8.48%
		-0.001 [-0.18]	0.009 [7.07]	0.246 [3.26]	-0.001 [-0.82]	-0.003 [-3.73]	**-7.49E-05 [-2.63]**			8.62%
		-0.025 [-3.70]	0.012 [7.54]	0.236 [3.23]	0.003 [2.37]	-0.005 [-4.84]		**0.001 [3.39]**		9.55%
		0.074 [6.32]	0.003 [2.89]	0.248 [3.21]	-0.013 [-5.84]	0.007 [4.00]			**0.012 [7.56]**	10.24%
		0.049 [3.65]	0.005 [2.99]	0.256 [3.24]	-0.009 [-3.60]	0.004 [2.35]	**-9.30E-05 [-3.05]**	**0.004 [2.42]**	**0.010 [6.59]**	10.93%
Tunisia	2,015	0.110 [13.68]	-0.010 [-3.91]	0.225 [2.18]	-0.011 [-10.25]	-0.004 [-3.86]				21.55%
		0.110 [13.88]	-0.010 [-3.89]	0.239 [2.35]	-0.011 [-9.98]	-0.004 [-3.67]	**-5.56E-07 [-2.36]**			21.56%
		0.072 [7.72]	-0.007 [-2.94]	0.221 [2.18]	-0.004 [-3.80]	-0.004 [-3.57]		**0.001 [5.85]**		23.49%
		0.154 [5.31]	-0.043 [-1.88]	0.238 [2.30]	-0.044 [-1.94]	0.029 [1.27]			**0.035 [1.47]**	21.66%
		0.118 [4.01]	-0.042 [-1.86]	0.251 [2.50]	-0.040 [-1.77]	0.032 [1.38]	**-6.15E-07 [-2.38]**	**0.001 [5.78]**	**0.035 [1.56]**	23.64%
Egypt	5,147	0.058 [3.17]	-0.007 [-3.94]	0.263 [1.45]	-0.018 [-7.89]	0.005 [2.27]				20.01%
		0.056 [3.18]	-0.006 [-3.54]	0.253 [1.41]	-0.017 [-7.91]	0.005 [2.30]	**0.002 [2.47]**			20.49%
		0.064 [3.79]	-0.006 [-4.01]	0.259 [1.44]	-0.017 [-8.46]	0.005 [2.19]		**1.51E-05 [2.91]**		21.06%
		0.058 [0.92]	-0.007 [-0.16]	0.263 [1.45]	-0.017 [-0.39]	0.006 [0.12]			-0.001 [-0.04]	19.99%
		0.068 [1.14]	-0.011 [-0.25]	0.250 [1.41]	-0.021 [-0.49]	0.009 [0.22]	**0.002 [2.29]**	**1.45E-07 [2.67]**	0.005 [0.11]	21.44%

	N	Intercept	Price	Volatility	Volume	Size	Amihud	Liu	Turnover	Adj-R^2
Kenya	2,775	0.219 [10.88]	-0.013 [-2.25]	0.203 [3.63]	-0.015 [-6.85]	-0.012 [-3.84]				6.12%
		0.219 [11.00]	-0.009 [-1.38]	0.155 [3.18]	-0.013 [-5.35]	-0.013 [-4.06]	**0.005 [1.54]**			6.63%
		0.127 [4.74]	-0.012 [-2.15]	0.209 [3.70]	-0.006 [-2.47]	-0.007 [-2.17]		**0.002 [4.30]**		6.76%
		0.271 [4.72]	-0.052 [-1.23]	0.197 [3.40]	-0.053 [-1.33]	0.026 [0.65]			0.038 [0.96]	6.11%
		0.179 [2.95]	-0.049 [-1.12]	0.152 [3.04]	-0.045 [-1.09]	0.033 [0.79]	**0.005 [1.56]**	**0.002 [4.47]**	0.041 [0.98]	7.31%
South Africa	10,225	0.214 [18.31]	-0.040 [-14.73]	1.130 [18.18]	-0.045 [-29.16]	0.011 [8.41]				54.27%
		0.214 [18.47]	-0.040 [-14.80]	1.132 [18.17]	-0.045 [-29.26]	0.011 [8.44]	**-0.023 [-4.16]**			54.34%
		0.198 [12.87]	-0.039 [-15.62]	1.335 [18.28]	-0.042 [-20.30]	0.011 [8.17]		**0.001 [1.65]**		54.93%
		0.198 [8.14]	-0.028 [-1.96]	1.131 [18.22]	-0.033 [-2.27]	-0.001 [-0.03]			-0.012 [-0.81]	54.30%
		0.184 [7.47]	-0.029 [-2.14]	1.134 [18.30]	-0.032 [-2.33]	0.001 [0.04]	**-0.023 [-4.17]**	**0.001 [1.65]**	-0.010 [-0.73]	55.00%
Namibia	1,322	-3.186 [-3.57]	-0.176 [-3.67]	0.067 [0.54]	0.003 [0.43]	0.391 [3.75]				20.24%
		-3.302 [-3.63]	-0.181 [-3.73]	0.054 [0.47]	0.003 [0.51]	0.403 [3.81]	**3.90E-05 [1.69]**			20.33%
		-3.188 [-3.57]	-0.176 [-3.66]	0.066 [0.54]	0.003 [0.49]	0.390 [3.75]		6.80E-05 [0.25]		20.18%
		-3.575 [-4.01]	-0.196 [-4.06]	0.059 [0.46]	-0.047 [-1.95]	0.451 [4.29]			**0.064 [2.31]**	20.64%
		-3.741 [-4.12]	-0.203 [-4.17]	0.043 [0.37]	-0.051 [-2.05]	0.471 [4.42]	**4.64E-05 [1.95]**	-3.69E-05 [-0.16]	**0.069 [2.49]**	20.73%

Notes: Bold indicates those coefficients with statistical significance in excess of 90% confidence margin

Table 4 Average number of stocks in each of the 9 size-illiquidity portfolios sorted by country by year in period: 2002-2008

Table reporting average numbers of stocks contained within each of nine separate size and illiquidity sorted portfolios for each market universe. These are formed from market universes based on UK's FTSE All-Share, France's CAC All-Share and then a North African market universe constituent to all North African listed stocks, a similarly constructed Sub Saharan African universe – constituent to all stocks in Nigeria, Kenya, Namibia (local market), Zambia and Botswana, and finally a South African universe constituent to all listed stocks in South Africa and closely related Namibia. Stock sorting and portfolio rebalancing is undertaken each December for entire duration of sample time frame. Namibia is included in both Sub Saharan African and South African universes as is a unique case of Sub Saharan African market that also has an integrated trading link with South Africa. These nine size-illiquidity sorted portfolios are formed by a three-by-three sorting process. All stocks in universe are first ranked in accordance to size and thus into three size ranked portfolios. Each size ranked portfolio is then subjected to a further sorting based on illiquidity thereby forming a further three illiquidity ranked portfolios in each case.

Portfolio	**S/L**	**S/M**	**S/H**	**M/L**	**M/M**	**M/H**	**B/L**	**B/M**	**B/H**
Market: UK									
London (FTSE All Share)	**40.00**	**39.55**	**36.52**	**38.62**	**40.69**	**36.99**	**38.92**	**41.99**	**38.50**
Market: France									
Paris (CAC All Share)	**42.85**	**44.78**	**42.15**	**44.57**	**45.71**	**42.09**	**45.00**	**44.84**	**42.71**
Market: North Africa									
Egypt	10.29	6.00	9.00	14.00	8.43	3.00	7.00	2.00	3.00
Morocco	0.93	2.00	3.14	0.00	2.98	6.86	3.00	5.92	6.86
Tunisia	2.00	4.00	1.00	1.00	3.00	6.00	5.00	6.00	4.00
Mean:	**13.21**	**12.00**	**13.14**	**15.00**	**14.40**	**15.86**	**15.00**	**13.92**	**13.86**
Market: SSA (Excl. RSA)									
Nigeria	0.00	0.00	0.00	4.72	0.79	0.00	10.82	5.79	0.00
Kenya	10.00	7.00	7.92	8.53	6.00	4.89	0.93	0.99	0.00
Namibia	0.00	0.00	2.00	0.00	0.00	2.87	0.00	0.00	0.00
Zambia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.92	8.17
Botswana	0.00	3.73	0.86	0.00	4.00	2.77	0.00	0.00	0.00
Mean:	**10.00**	**10.73**	**10.78**	**13.26**	**10.79**	**10.52**	**11.76**	**12.70**	**8.17**
Market: South Africa									
South Africa	12.70	14.27	9.19	17.68	14.07	14.27	16.86	13.00	14.71
Namibia	0.00	0.00	4.74	0.00	0.00	0.00	0.00	0.00	0.00
Mean:	**12.70**	**14.27**	**13.93**	**17.68**	**14.07**	**14.27**	**16.86**	**13.00**	**14.71**

Table 5 Summary statistics for equally weighted monthly excess returns on 9 portfolios formed on size and illiquidity for period 2002 to 2008

Table reporting descriptive statistics for nine size-illiquidity sorted portfolios formed from ranking and rebalancing process detailed in preceding Table 4.

Portfolio	S/L	S/M	S/H	M/L	M/M	M/H	B/L	B/M	B/H
Panel A: Summary Statistics for portfolios									
UK (FTSE All Share)									
Mean	0.69%	0.36%	0.36%	-0.14%	0.47%	0.42%	-0.29%	0.06%	0.52%
Std. Dev.	6.50%	5.60%	4.88%	6.95%	5.44%	5.25%	6.50%	4.96%	4.50%
Skewness	-0.4392	-0.6831	-0.6437	-1.1102	-1.3154	-1.0469	-0.8064	-1.0977	-0.7485
Excess Kurtosis	4.4234	4.7287	4.4060	4.8286	5.2062	5.3983	3.9113	4.5944	4.2565
France (CAC All Share)									
Mean	0.19%	1.30%	1.75%	0.52%	1.19%	1.10%	0.27%	0.56%	0.78%
Std. Dev.	9.78%	7.49%	8.48%	9.66%	6.47%	7.18%	6.70%	6.78%	5.51%
Skewness	0.4043	0.9837	5.2895	0.2169	-0.2708	4.1565	-0.6132	-0.5263	-0.9932
Excess Kurtosis	5.0777	7.1782	41.6813	5.1700	4.6559	34.0182	4.2994	5.0468	5.2148
North Africa									
Mean	2.00%	1.71%	0.12%	2.27%	1.92%	1.16%	2.05%	2.58%	0.95%
Std. Dev.	7.52%	5.20%	3.55%	9.11%	5.20%	3.78%	5.46%	5.22%	3.55%
Skewness	0.3693	0.0929	0.6626	0.8201	0.4306	0.2237	-0.4099	0.3817	-0.6351
Excess Kurtosis	3.5889	2.6394	4.3447	4.9198	4.1632	3.4270	4.5507	2.8852	4.9243
Sub Saharan Africa									
Mean	4.14%	5.08%	0.78%	2.92%	5.54%	2.48%	2.59%	2.32%	5.48%
Std. Dev.	10.98%	12.94%	5.66%	9.06%	16.45%	5.07%	7.11%	7.56%	30.84%
Skewness	1.0623	4.2679	1.8479	0.1375	5.1734	0.4022	-0.0279	1.7870	8.0741
Excess Kurtosis	4.1811	28.4699	7.9806	3.5922	37.7099	5.3684	4.4232	13.2611	70.4814
South Africa									
Mean	3.22%	3.78%	3.45%	2.07%	2.14%	2.20%	1.81%	1.76%	1.97%
Std. Dev.	9.09%	8.35%	8.12%	8.23%	8.11%	7.49%	8.04%	7.85%	7.55%
Skewness	-0.4408	-0.4169	0.3547	-0.4230	-0.4548	-0.6059	-0.2822	-0.6786	-0.7359
Excess Kurtosis	3.1252	2.9430	3.3875	3.4607	3.3583	3.4804	2.8291	3.5500	4.0560

Panel B: Summary Statistics for country portfolios									
Overall					**Top Stocks***				
	Mean	**Std. Dev.**	**Skewness**	**Ex. Kurtosis**		**Mean**	**Std. Dev.**	**Skewness**	**Ex. Kurtosis**
UK (FTSE All Share)	0.65%	5.32%	-1.010	1.989	FTSE 100	0.27%	4.86%	-1.028	4.342
France (CAC All Share)	1.20%	6.26%	-0.685	1.295	CAC 40	0.28%	6.42%	-0.535	5.162
South Africa	2.04%	6.87%	-0.698	4.013	Top 10	4.11%	32.84%	-1.402	12.962
Namibia	1.18%	5.49%	1.002	5.965	-- --	-- --	-- --	-- --	-- --
Kenya	2.46%	6.59%	0.008	4.317	Top 5	3.55%	9.33%	0.532	4.128
Egypt	2.08%	6.93%	0.260	3.376	Top 10	2.55%	7.86%	0.170	2.885
Morocco	1.65%	4.05%	0.393	3.348	Top 10	1.73%	5.47%	0.258	4.601
Tunisia	0.85%	3.29%	0.237	2.857	Top 5	3.02%	17.79%	2.212	14.783
Nigeria	4.51%	15.01%	5.923	45.245	Top 10	2.76%	9.42%	2.015	14.392
Zambia	4.29%	14.86%	5.526	41.478	Top 3	3.37%	10.61%	0.216	3.603
Botswana	3.01%	17.68%	8.482	75.951	Top 3	1.71%	4.79%	0.282	3.407

Table 6 Time series regressions using equally weighted monthly market excess returns for 9 portfolios formed on size and illiquidity for period: 2002 – 2008, for all markets.

Portfolio	**S/L**	**S/M**	**S/H**	**M/L**	**M/M**	**M/H**	**B/L**	**B/M**	**B/H**
Market: UK (FTSE All Share)									
Panel A: CAPM									
$\hat{\alpha}(\%)$	0.0035	0.0007	0.0012	-0.0049	0.0019	0.0015	-0.0062	-0.0018	0.0029
	(1.24)	(0.44)	(0.51)	(-2.38)	(1.02)	(0.73)	(-3.75)	(-1.06)	(1.48)
$\hat{\beta}$	1.1516	0.9798	0.8209	1.2386	0.9786	0.9416	1.1821	0.8804	0.7897
	(19.32)	(21.53)	(14.68)	(20.74)	(17.61)	(20.83)	(38.83)	(22.87)	(13.44)
Adj R^2 (1)	0.8818	0.8593	0.7942	0.8937	0.9092	0.9036	0.9306	0.8864	0.8669
Panel B: Three-factor CAPM									
$\hat{\alpha}$	0.0028	-0.0007	-0.0017	-0.0021	0.0022	-0.0003	-0.0041	-0.0011	0.0029
	(1.82)	(-0.49)	(-1.26)	(-1.41)	(1.26)	(-0.19)	(-3.55)	(-1.25)	(1.82)
$\hat{\beta}$	0.9180	0.9916	0.9739	1.0026	0.9922	1.1349	1.0544	0.9532	0.9180
	(13.33)	(19.06)	(25.52)	(22.87)	(15.29)	(25.57)	(33.49)	(33.47)	(13.33)
$\hat{s}$	-0.1436	0.1701	0.1768	-0.0676	-0.0499	-0.0058	-0.1160	-0.1785	-0.1437
	(-9.11)	(8.15)	(12.23)	(-2.73)	(-2.01)	(-0.39)	(-8.80)	(-17.18)	(-9.11)
$\hat{h}$	0.1117	0.0278	0.1665	-0.2374	0.0084	0.1885	-0.1359	0.0541	0.1118
	(5.02)	(0.65)	(6.03)	(-4.86)	(0.24)	(8.26)	(-5.24)	(3.83)	(5.02)
Adj R^2 (4)	0.9394	0.9206	0.9324	0.9391	0.9124	0.9411	0.9696	0.9684	0.9394
Market: France (CAC All Share)									
Panel A: CAPM									
$\hat{\alpha}(\%)$	-0.0102	0.0054	0.0124	-0.0071	0.0039	0.0048	-0.0056	-0.0029	0.0007
	(-2.35)	(1.05)	(1.77)	(-2.26)	(1.44)	(1.01)	(-2.18)	(-1.05)	(0.39)
$\hat{\beta}$	1.4342	0.9025	0.6016	1.4635	0.9494	0.7408	0.9889	1.0051	0.8368
	(10.57)	(11.89)	(5.84)	(14.27)	(21.58)	(4.43)	(18.60)	(17.06)	(18.79)
Adj R^2 (1)	0.8409	0.5634	0.1872	0.8977	0.8415	0.4103	0.8521	0.8596	0.9034
Panel B: Three-factor CAPM									
$\hat{\alpha}$	-0.0031	0.0061	-0.0015	-0.0004	0.0043	-0.0026	-0.0031	-0.0002	0.0011
	(-1.24)	(1.12)	(-0.39)	(-0.18)	(1.56)	(-0.79)	(-2.23)	(-0.12)	(0.93)
$\hat{\beta}$	1.0207	0.7681	1.0573	1.1509	0.9515	1.1957	0.9710	0.9818	0.8915
	(13.55)	(6.28)	(4.47)	(19.28)	(18.55)	(3.69)	(13.95)	(21.85)	(15.35)
$\hat{s}$	0.1376	0.1606	0.2873	0.0119	-0.0349	-0.1816	-0.1499	-0.1554	-0.1076
	(3.73)	(1.36)	(2.52)	(0.48)	(-1.14)	(-2.22)	(-5.01)	(-9.56)	(-7.45)
$\hat{h}$	-0.2334	-0.0686	0.2847	-0.1822	-0.0009	0.2549	-0.0199	-0.0233	0.0253
	(-6.87)	(-1.12)	(3.06)	(-5.94)	(-0.04)	(1.99)	(-0.85)	(-1.32)	(1.11)
Adj R^2 (4)	0.9455	0.6189	0.7195	0.9662	0.8423	0.6493	0.9376	0.9514	0.9549

Market: North Africa									
Panel A: CAPM									
$\hat{\alpha}$(%)	-0.0053	0.0073	-0.0067	-0.0114	0.0032	-0.0114	0.0025	0.0082	0.0021
	(-1.12)	(1.07)	(-1.39)	(-2.45)	(0.95)	(-2.45)	(0.45)	(2.57)	(0.57)
$\hat{\beta}$	1.5189	0.5867	0.4746	2.0368	0.9615	2.0368	1.0756	1.0532	0.4406
	(12.52)	(4.00)	(5.80)	(12.74)	(10.73)	(12.74)	(7.92)	(12.93)	(4.17)
Adj R^2 (1)	0.6123	0.1826	0.2608	0.7529	0.5117	0.7529	0.5823	0.6113	0.2238
Panel B: Three-factor CAPM									
$\hat{\alpha}$	0.0011	0.0098	-0.0046	-0.0092	0.0021	0.0021	-0.0001	0.0049	-0.0021
	(0.32)	(1.81)	(-1.58)	(-2.54)	(0.58)	(0.68)	(-0.03)	(1.65)	(-0.79)
$\hat{\beta}$	0.8787	0.9739	0.8761	1.2376	1.1247	1.0258	0.7402	1.0269	0.9581
	(7.02)	(6.69)	(8.32)	(9.58)	(7.30)	(9.31)	(6.66)	(9.03)	(9.39)
$\hat{s}$	0.2158	0.1745	0.1560	-0.0115	-0.0264	0.0035	-0.1707	-0.1564	-0.1262
	(4.85)	(2.82)	(6.68)	(-0.35)	(-0.54)	(0.14)	(-6.79)	(-7.37)	(-7.21)
$\hat{h}$	-0.1969	0.1201	0.1243	-0.2467	0.0503	0.1692	-0.1039	-0.0085	0.1594
	(-4.66)	(3.37)	(5.23)	(-6.82)	(1.61)	(7.31)	(-3.02)	(-0.30)	(6.40)
Adj R^2 (4)	0.8005	0.3718	0.6422	0.8453	0.5155	0.4822	0.7409	0.7140	0.6394
Market: Sub Saharan Africa (Excluding RSA)									
Panel A: CAPM									
$\hat{\alpha}$(%)	-0.0007	0.0137	0.0062	0.0045	0.0003	0.0169	0.0027	0.0018	-0.0347
	(-0.07)	(1.34)	(0.78)	(0.54)	(0.04)	(2.38)	(0.31)	(0.21)	(-0.96)
$\hat{\beta}$	1.2760	1.1227	0.0494	0.7484	1.6693	0.2420	0.7019	0.6507	2.7122
	(3.79)	(2.19)	(0.42)	(2.67)	(3.39)	(1.97)	(3.44)	(5.29)	(1.51)
Adj R^2 (1)	0.3663	0.1986	0.0021	0.1788	0.2764	0.0515	0.2608	0.1953	0.2044
Panel B: Three-factor CAPM									
$\hat{\alpha}$	-0.0041	0.0025	0.0038	0.0055	-0.0032	0.0158	0.0049	0.0035	-0.0097
	(-0.49)	(0.27)	(0.58)	(0.75)	(-0.42)	(2.18)	(0.76)	(0.41)	(-0.95)
$\hat{\beta}$	1.3331	1.6048	0.1859	0.6329	1.7579	0.3034	0.5402	0.5614	2.0195
	(5.76)	(3.88)	(1.21)	(2.74)	(3.17)	(1.94)	(3.57)	(4.70)	(12.90)
$\hat{s}$	0.0136	0.3276	0.1019	-0.0999	0.0423	0.0461	-0.1288	-0.0652	-0.3601
	(0.29)	(3.05)	(2.37)	(-2.97)	(0.39)	(1.23)	(-4.18)	(-1.67)	(-8.09)
$\hat{h}$	-0.1277	0.1757	0.1034	-0.1686	-0.0736	0.0483	-0.1710	-0.0589	0.3812
	(-3.16)	(2.19)	(3.09)	(-6.77)	(-0.98)	(1.47)	(-6.75)	(-2.14)	(10.85)
Adj R^2 (4)	0.5993	0.5749	0.1999	0.4135	0.3248	0.0904	0.6313	0.2224	0.9409

Market: South Africa									
Panel A: CAPM									
$\hat{\alpha}$(%)	0.0037	0.0129	0.0160	-0.0054	-0.0042	-0.0015	-0.0062	-0.0069	-0.0041
	(1.33)	(3.26)	(2.84)	(-2.07)	(-1.69)	(-0.76)	(-1.63)	(-2.12)	(-1.14)
$\hat{\beta}$	1.1601	1.0112	0.7519	1.0633	1.0429	0.9571	0.9873	0.9979	0.9659
	(23.73)	(18.66)	(8.53)	(28.84)	(38.86)	(29.30)	(21.60)	(27.59)	(18.95)
Adj R^2 (1)	0.9050	0.8146	0.4713	0.9283	0.9189	0.9073	0.8376	0.8996	0.9111
Panel B: Three-factor CAPM									
$\hat{\alpha}$	-0.0005	0.0054	0.0037	-0.0035	-0.0043	-0.0035	0.0026	0.0002	0.0021
	(-0.19)	(1.85)	(1.03)	(-1.51)	(-1.57)	(-1.51)	(0.81)	(0.16)	(0.89)
$\hat{\beta}$	1.0381	0.9515	1.0245	0.9977	1.0146	0.9665	0.9697	1.0333	1.0128
	(26.45)	(26.09)	(13.19)	(24.48)	(34.59)	(22.23)	(14.06)	(46.59)	(28.75)
$\hat{s}$	0.1659	0.2005	0.1065	-0.0026	0.0179	0.0369	-0.1832	-0.1802	-0.1635
	(5.71)	(4.81)	(2.71)	(-0.11)	(0.59)	(1.36)	(-5.41)	(-7.64)	(-7.61)
$\hat{h}$	-0.2365	-0.1216	0.5050	-0.1228	-0.0539	0.0157	-0.0239	0.0751	0.0959
	(-5.71)	(-2.08)	(8.39)	(-3.86)	(-1.46)	(0.41)	(-0.53)	(3.23)	(3.36)
Adj R^2 (4)	0.9436	0.8707	0.8533	0.9427	0.9190	0.9103	0.9215	0.9576	0.9587

Notes: (1) Numbers in parentheses are t-statistics.
(2) One month T-bill risk free rate for month t, which is taken as the one month UK Gilt rate

Table 7 Cost of Equity estimates derived from multi-factor regression

Annualized cost of equity estimates generated at 12/2008 from the total risk premium. The UK Gilt/ Treasury 1 month rate is used in each case for risk-free rate

	Market Universe	Overall	Top Stocks
UK FTSE100	UK	-- --	0.40%
France CAC40	France	-- --	0.51%
Egypt	North Africa	33.11%	33.52%
Tunisia	North Africa	9.21%	29.13%
Morocco	North Africa	18.63%	20.88%
Nigeria	SSA (Excl South Africa)	63.82%	32.90%
Kenya	SSA (Excl South Africa)	28.07%	30.99%
Botswana	SSA (Excl South Africa)	46.69%	6.74%
Zambia	SSA (Excl South Africa)	56.83%	35.53%
Namibia	SSA (Excl South Africa)	22.01%	-- --
Namibia	South Africa	17.28%	-- --
South Africa	South Africa	31.41%	13.36%

Table 8 Minimum-variance portfolio statistics using top stocks by market and legal regime

	Mean Return	Std. Dev.	Max Return	Min Return	Sharpe Ratio
Panel 1: Performance					
Common Law Portfolio	25.31%	4.65%	50.36%	-11.75%	1.1624
Civil Code Law Portfolio	30.00%	3.26%	59.49%	-2.44%	1.5359

Panel 2: Optimized assets weights of minimum variable Portfolio

Civil Code Law	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
France (CAC40)	14.74%	3.30%	11.93%	21.56%	37.60%	19.79%
Morocco	42.30%	34.73%	32.51%	31.13%	17.86%	34.06%
Tunisia	35.46%	33.54%	23.58%	11.26%	22.77%	27.25%
Egypt	7.50%	28.87%	31.98%	36.05%	21.77%	18.89%
Common Law						
UK (FTSE100)	9.51%	17.36%	44.15%	60.56%	28.97%	49.93%
Kenya	12.51%	3.56%	3.37%	0.96%	11.32%	3.28%
Nigeria	45.88%	9.42%	5.42%	11.44%	0.84%	0.00%
Zambia	9.70%	1.61%	2.72%	0.00%	1.54%	7.31%
Botswana	10.96%	29.46%	28.77%	6.62%	19.27%	3.33%
Namibia	9.78%	25.34%	6.70%	2.95%	26.52%	21.77%
South Africa	1.66%	13.25%	8.88%	17.47%	11.54%	14.39%

Figure 1. Efficient Frontier for Common Law top stock portfolio

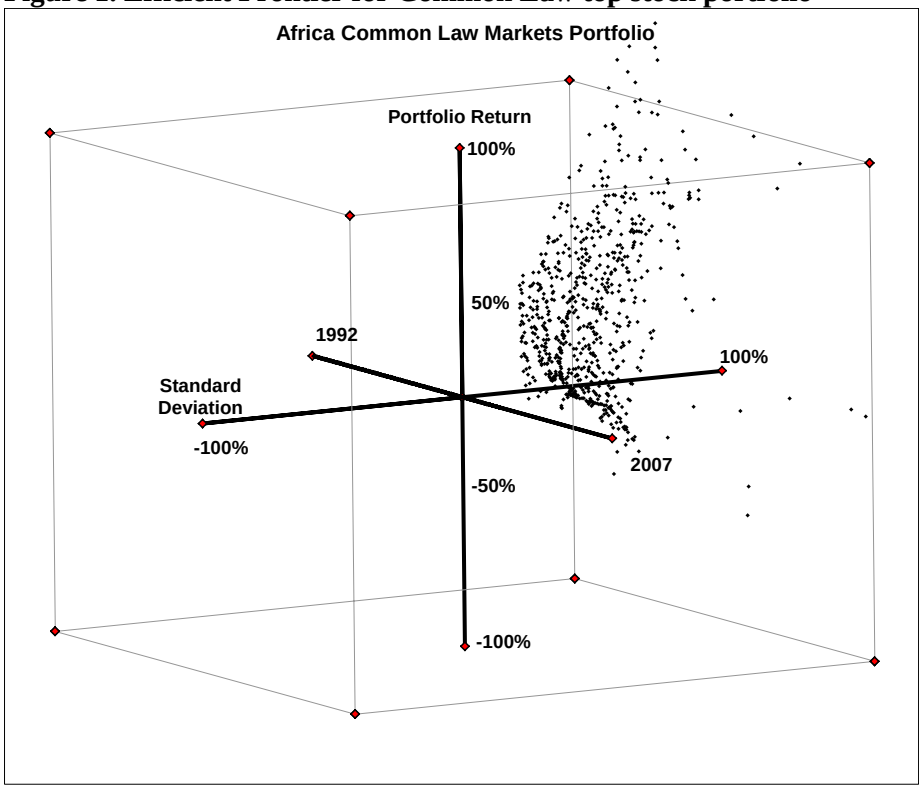
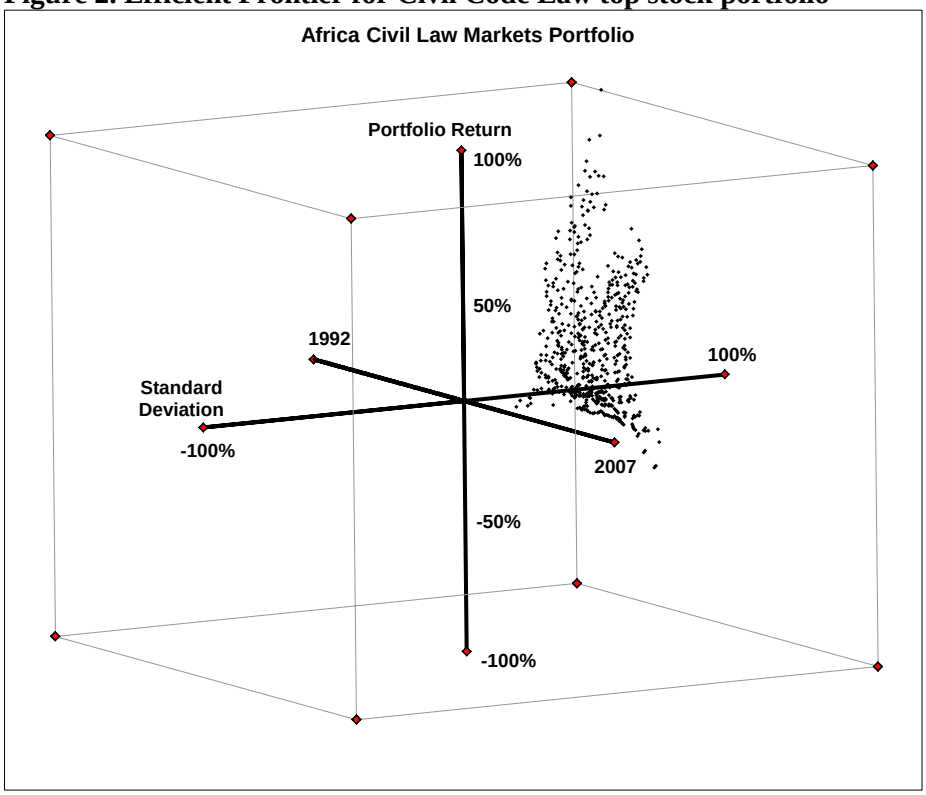


Figure 2. Efficient Frontier for Civil Code Law top stock portfolio



Appendix Table 1 Contrast of secondary market regulations and commissions

	Commercial Law	No. Brokers	Market Clearance Procedures	Capital Gains Tax	Other taxes	Commission
London	Common law	1570	G30	Exempt	None	Total direct costs of trading (brokerage commission and fees): 0.0401%. Total indirect trading costs: 0.0101% Total trading costs: 0.0502%
Paris	Civil code		G30	Exempt	None	Trade fees are contingent on level of market activity of broker. Fees fall within range of 0.0000875% to 0.001% of trading value and are dependent on level of traded value.
South Africa	Common law	101	Fully G30 compliant including custodial facilities. DVP undertaken T + 3	Exempt	VAT at commission rate 0.5% marketable security. 1.0% stamp duty Investor Protection fee: 0.0002%	Main Market: 1.4%, trades < R1,500,000 and 0.21%, trades > R1,500,000 Equities main market minimum fee: R7.42 or R8.46(incl. VAT) on both buy and sell legs of a position Clearing and Settlement Fee: 0.0026% Subject to minimum of R2.33 (R2.66 incl. VAT) on buy leg and R9.43 (R10.75 incl. VAT) on sell side leg
Namibia	Common law	6	As South Africa	Exempt	As South Africa	As South Africa
Kenya	Common law	18	Partial G30 compliant. DVP undertaken T + 3.	Exempt	Withholding Tax on Dividends is 10% for non-residents and 5% for residents. Otherwise no Capital Gains, Stamp Duty, nor VAT	Main Market: Brokerage commission charged as follows, Trade value < KSh 100,000 fee of 1.80% Trade value > KSh 100,000 fee of 1.50% 0.14% of trade value in Kenyan Shillings applied to buy and sell legs. 0.01% applied to buy and sell legs for the investment compensation fund.
Egypt	Civil code	146	Fully G30 compliant including custodial facilities. DVP undertaken T + 3.	Exempt	None	Listed securities, the Exchange service fees are levied at 0.012% of the value of each side of the transaction with a maximum amount of LE (Egyptian Pounds) 5000. Clearing fee: 0.125 per thousand of transaction value
Morocco	Civil code	15	Fully G30 compliant including custodial facilities. DVP undertaken T + 3.	Exempt	VAT applied to the amount of commissions is 10%. No other tax/ fees	Standard fee of 0.1% of trade value in Moroccan Dirhams (MAD) levied against buyers and sellers engaging in securities transfer or dealing. This fee, Negotiation des Titres, is applied to both buy and sell legs of trade
Tunisia	Civil code	24	Fully G30 compliant including custodial facilities. DVP undertaken T + 3.	Exempt	None	Two fees: First is fee of 0.20% on transactions less than 50,000TDN and 0.10% on those above. Second fee is sliding schedule depending on value traded and ranges from 0.25% <0.5m TDN to 0.05% for >3m TDN

Notes: South Africa and Namibia adhere to Roman-Dutch civil code but commercial and securities regulatory law follows English common law